

CLAIMS

1. A semiconductor device having a metal oxide layer in contact with an adhesive over a substrate with an insulating surface and having an element above the metal oxide layer.
2. The semiconductor device according to claim 1, wherein the element is a thin film transistor, an organic light-emitting element, an element comprising a liquid crystal, a memory element, a thin film diode, a photoelectric conversion element comprising PIN junction of silicon, or silicon resistor element.
3. The semiconductor device according to claim 1 or claim 2, wherein the substrate is a plastic substrate with a planar surface or a curved surface.
4. The semiconductor device according to any one of claims 1 to 3, wherein the metal oxide layer is formed by irradiation of a laser beam, heat treatment, or compound treatment of irradiation of a laser beam and heat treatment.
5. The semiconductor device according to any one of claims 1 to 4, wherein the semiconductor device is a video camera, a digital camera, a goggle type display, a car navigation system, a personal computer, or a personal digital assistance.
6. A method of manufacturing a semiconductor device, comprising:
 - a step of forming, over a substrate, a metal layer, an oxide layer in contact with the metal layer, and a layer to be peeled including a semiconductor element over the oxide layer;
 - a step of oxidizing the metal layer to form a metal oxide layer between the metal layer and the oxide layer;
 - a step of peeling the layer to be peeled that is bonded to the support from the substrate with a physical means within the metal oxide layer, at an interface between the metal oxide layer and the oxide layer, or at an interface between the metal oxide layer and the metal layer after bonding a support and the layer to be peeled.
7. A method of manufacturing a semiconductor device, comprising:
 - a step of forming an insulator layer on a substrate, a metal layer in contact with the insulator layer, an oxide layer in contact with the metal layer, and a layer to be peeled including a semiconductor element above the oxide layer;
 - a step of oxidizing the metal layer to form a metal oxide layer between the

metal layer and the insulating layer, between the metal layer and the oxide layer, or both between the metal layer and the insulating layer and between the metal layer and the oxide layer;

a step of peeling the layer to be peeled that is bonded to the support from the substrate with a physical means within the metal oxide layer in contact with the insulating layer, at an interface between the metal oxide layer in contact with the insulating layer and the insulating layer, at an interface between the metal oxide layer in contact with the insulating layer and the metal layer, within the metal oxide layer in contact with the oxide layer, at an interface between the metal oxide layer in contact with the oxide layer and the oxide layer, or at an interface between the metal oxide layer in contact with the oxide layer and the metal layer after bonding a support and the layer to be peeled.

8. A method of manufacturing a semiconductor device, comprising:

a step of forming, over a substrate, a metal layer, an oxide layer in contact with the metal layer, and a layer to be peeled including a semiconductor element over the oxide layer;

a step of oxidizing the metal layer to form a metal oxide layer between the metal layer and the oxide layer;

a step of peeling the layer to be peeled that is bonded to the support from the substrate with a physical means at a portion between the metal layer and the oxide layer.

9. The method according to any one of claims 6 to 8, wherein the step of oxidizing the metal film is conducted with irradiation of a laser beam, heat treatment, or compound treatment of irradiation of a laser beam and heat treatment.

10. The method according to claim 9, wherein the laser beam is light emitted from a continuous wave oscillation or pulse oscillation solid laser.

11. The method according to any one of claims 6 to 10, wherein the metal layer is a single layer comprising an element selected from Ti, Ta, W, Mo, Cr, Nd, Fe, Ni, Co, Zr, and Zn, or one of an alloy material and a compound material including the element as its main component, or a lamination layer thereof.

12. The method according to any one of claims 6 to 11, wherein the oxide layer in

contact with the metal layer is a silicon oxide film formed by sputtering.

13. The method according to any one of claims 6 to 12, wherein the substrate is a glass substrate or a quartz substrate, and the support is a plastic substrate or a plastic base material.

- 5 14. The method according to any one of claims 6 to 13, wherein the layer to be peeled includes a thin film transistor, a photoelectric conversion element comprising a PIN junction of silicon, an organic light-emitting element, an element comprising a liquid crystal, a memory element, a thin film diode, or silicon resistor element.

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